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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/986,987	11/13/2001	Takanobu Nishida	900-407	6028

7590 06/27/2003

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EXAMINER	
OLSEN, ALLAN W	
ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 06/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/986,987	NISHIDA, TAKANOBU	
	Examiner	Art Unit	
	Allan W. Olsen	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 November 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 November 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4,5* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Objections

Claim 1 objected to because the examiner believes the phrase "having a resist mask formed through an insulating film" should read -- having a resist mask formed (over or on or overlying or...) an insulating film --. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 7 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 7 recites "...wherein the ratio (Ws/Wb)...". However, the claim lacks sufficient antecedent basis for Ws and Wb.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 7, 10 and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,272,417 issued to Ohmi.

Ohmi teaches ashing photoresist from a substrate by using an O2 plasma. The plasma is generated with energy from an RF power supply while a separate power supply provides an RF bias potential to the substrate. Ohmi teaches that ashing occurs without damaging the underlying substrate. A substrate that has been etched without sustaining damage would be expected to have the same physical properties before and after the etching process. as therefore to be unchanged as the would for a process in which the dielectric constant of the underlying insulation layer is unchanged. See: col 5, ln 11-18; col 18, ln 36-39; fig 1

Claims 1-6 and 10-12 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent 6,156,629 issued to Tao et al. (hereinafter, Tao).

Tao teaches ashing photoresist with an oxygen plasma generated with between 500 and 2000 W of RF energy from a plasma source power supply while a second RF power supply provides between about 100 and 300 W of RF bias power to the temperature controlled pedestal electrode upon which the substrate is supported. These limits of RF plasma source power and RF bias power provide for a source/bias ratio as low as 1.67. See col 8, lns 9-13.

Claims 1-6 and 8-12 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent 6,440,864 issued to Kropewnicki et al (hereinafter, Kropewnicki), with claim 8 alternatively rejected under 35 U.S.C. 103(a) in the following section of this Office action.

Kropewnicki teaches ashing a layer of photoresist with an oxygen plasma generated with between 100 and 5000 W of RF energy from a plasma source power supply while a second RF power supply provides between about 75 and 500 W of RF bias power to the temperature controlled pedestal electrode upon which the substrate is supported. Kropewnicki teaches a temperature of about 15°C to about 20°C. These power limits provide for a source/bias power ratio of as low as 0.2. See col 2, ln 13-21; col 5, ln 22-25; col 6, ln 55-60; col 7, ln 27, 62-65; col 11 lns 22-25; col 12 ln 50-52.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 7and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kropewnicki as applied to claim 1 above and further in view of U.S Patent 5,453,157 issued to Jeng.

As noted above, Kropewnicki teaches a temperature of about 15°C to about 20°C. While the examiner believes this temperature is recited in reference to the substrate temperature, Kropewnicki is not explicit on this point. While Kropewnicki is specifically directed to the ashing of photoresist in the presence of low-k dielectric materials, Kropewnicki does not explicitly teach that the low-k material is not damaged or that the value of the dielectric constant does significantly change.

Jeng teaches a me6thod of ashing photoresist etching that overlies a low-k dielectric layer. Jeng teaches that damage to polymeric low-k dielectric materials, such as those of Kropewnicki, can be eliminated by maintaining the temperature of the substrate between -20° C and 20°C during the photoresist ashing process.

It would have been obvious to one skilled in the art to maintain a substrate temperature of 20°C or less while carrying out the method of Kropewnicki because Kropewnicki is directed to a process of ashing photoresist in the presence of low-k dielectric materials and Jeng teaches that damage to the dielectric material can be eliminated by maintaining a low substrate temperature. Even if the skilled artisan does not presume that Kropewnicki teaches a substrate temperature of 15°C-20°C (which the examiner believe they would), the skilled artisan would, nevertheless, be motivated to use the low temperature of Jeng because by eliminating damage

to the low-k material, one would also eliminate the prospect of bringing about changes in the actual value of the dielectric constant.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allan Olsen whose telephone number is 703-306-9075. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Greg Mills, can be reached on 703-308-1633.

The general fax numbers for TC1700 are 703-872-9310 (non-after finals) and 703-872-9311(after-final).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0661.

Allan Olsen, Ph.D.
June 22, 2003